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Via E-Mail to dec-401cert@alaska.gov

Alaska Department of Environmental Conservation
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August 24, 2020

Re: Comments on State of Alaska Department of Environmental Conservation Notice of Application for State Water Quality Certification re Public Notice Reference Number POA-2017-00271, Multiple Waterbodies --- Pebble Limited Partnership Clean Water Act Section 404 Permit Application for the Proposed Pebble Project.

To Whom It May Concern:

Trustees for Alaska and Sierra Club, on behalf of the Alaska Center, Alaska Community Action on Toxics, Alaska Wilderness League, Alaska Wildlife Alliance, Audubon Alaska, Cook Inletkeeper, Defenders of Wildlife, Eyak Preservation Council, Friends of Alaska National Wildlife Refuges, Friends of the Earth, Friends of McNeil River, National Wildlife Federation, Natural Resources Defense Council, SalmonState, Sierra Club, and Wild Salmon Center submit the following comments in reference to the application for a Water Quality Certification under Section 401 of the Clean Water Act (CWA) for the Pebble Limited Partnership's (Pebble) proposed Pebble Mine.[1] These groups' members' rely on the numerous water resources that would be adversely impacted by the project for recreation, conservation, fish habitat, and many other beneficial uses.

The proposed Pebble Mine would negatively impact aquatic resources in the Bristol Bay watershed in several ways, including by creating a perpetual source of highly polluted water discharges. The Alaska Department of Environmental Conservation (DEC) cannot issue the Section 401 certification for the Pebble Mine at this time because Pebble has failed to provide

[1] *See* DEC Notice of Application for State Water Quality Certification, *https://www.poa.usace.army.mil/LinkClick.aspx?fileticket=HYntNq9bfrU%3d&portalid=34*; *see also* 83 Fed. Reg. 13,483–84, Dep't of the Army, Corps of Eng'rs Intent to Prepare an Envtl. Impact Statement (EIS) for the Pebble Project (NOI), Mar. 29, 2018; Public Notice of Application for Permit, May 30, 2019, Ref. # POA-2017-00271.

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adequate and requisite information on the water treatment technology that will be employed to reduce pollutant concentrations in the mine's discharges below applicable water quality standards. Instead, Pebble has offered only general, theoretical plans for water treatment, without the results of any pilot projects at the Pebble site, and without identifying any other mine in the world that has successfully treated the volume of water and concentration of pollutants projected for the Pebble Mine. Pebble's attempt to overcome this lack of specificity in its treatment plans by claiming that it could design and construct additional treatment as necessary is also deeply flawed and inadequate, because it is not clear that any technology exists capable of treating Pebble's discharges, and because this alternate plan would itself create unacceptable violations of water quality standards by eliminating flow in the receiving streams. Pebble has also failed to account for the impact of multiple sources of pollutants from the Pebble Mine, including fugitive dust deposition, combined with the elevated pollutant levels in the discharges from the mine's water treatment system, on downstream aquatic ecosystems.

I. THE PROPOSED PEBBLE MINE WOULD HAVE DEVASTATING IMPACTS ON THE BRISTOL BAY WATERSHED, AND ON THE AQUATIC ENVIRONMENT IN PARTICULAR.

The proposed Pebble Mine would industrialize the headwaters of the world's largest remaining sockeye salmon fishery. The impacted watershed supports more than 190 species of birds, 40 species of mammals, and 29 species of fish, and a thriving subsistence culture.[2] If approved, the proposed Pebble Mine would be one of the most damaging, if not the most damaging, projects ever permitted under the CWA.[3] The Bristol Bay headwaters are simply not the place for largescale, industrial mining.

The proposed Pebble Mine poses an unacceptable and unprecedented threat to the land, water, fisheries, animals, and people of Bristol Bay. The mine would destroy salmon habitat, threaten the world's largest sockeye salmon fishery and the economies that rely on it, disturb wildlife, destroy wetlands, threaten several world class brown bear viewing areas and the economy that depends on them, and permanently alter the way of life for those in the region that depend on salmon as food and the cultural thread that weaves through their communities.

The sheer scale and magnitude of impacts places the Pebble deposit in a category all its own. Whether looking at the stalking horse that is the proposed 20-year mine or the more likely mine that will last for at least a century, the impacts are enormous. PLP pitches the 20-year mine as a "small mine." That is a farce. The "small mine" would result in the direct and permanent

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[2] *See* Environmental Protection Agency, *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay Alaska,* EPA 910-R-14-001ES at E5, ES–8 and ES–25 (2014) (Watershed Assessment or BBWA) (attached to these comments).

[3] Schweisberg, Matthew, May 14, 2019, *Pebble Mine: Anticipated Adverse Impacts to Wetlands*, A Report Prepared for Trustees for Alaska (Schweisberg, 2019a) at 1 (attached to these comments).

loss of 105.4 miles of streams and 2,231 acres of wetlands.[4] The indirect impact would lead to the loss of another 79.5 miles of streams and 1,609 acres of wetlands.[5] The temporary losses include 773 acres of wetlands and 6.2 miles of streams.[6] The total impact from the proposed Phase 1 amounts to a direct, indirect, and temporary loss of 4,614 acres of wetlands and 191.1 miles of streams.[7] The dire nature of destroying critical headwaters grows with the larger, more likely version of the mine that would be in production for an estimated 78 years, with a 20-year closure plan. This mine would extract approximately 55% of the deposit, indicating that there could be another mine expansion after 78 years. The 78-year mine would destroy an additional 288 miles of streams and 8,495 acres of wetlands.[8]

In addition to the mine's primary area ore removal and processing facility, development and operation of the mine would require the construction of an 82-mile industrial road and a new industrial port facility in the waters of Cook Inlet. Turning what is currently a pristine, undeveloped area, home to the world's largest concentration of brown bears and unparalleled salmon habitat into a major industrial zone will have far-reaching, extreme, and catastrophic impacts.

II. DEC CANNOT MAKE THE FINDINGS REQUIRED TO SUPPORT ISSUANCE OF A SECTION 401 CERTIFICATION FOR THE PROJECT.

Because the Pebble Mine is a project that requires a permit issued by the U.S. Army Corps of Engineers (Corps) under Section 404 of the CWA, it also requires a state-issued certification under Section 401 of the CWA. Section 401 provides that

> Any applicant for a Federal license or permit to conduct any activity, including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the State in which the discharge originates or will originate ... that any such discharge will comply with the applicable provisions of section 1311, 1312, 1313, 1316, and 1317 of this title[.][9]

Among other things, a certification under Section 401 must ensure that a federally permitted project complies with Section 303 of the CWA, 33 U.S.C. § 1313. That section "requires each state, subject to federal approval, to institute comprehensive water quality standards establishing water quality goals for all intrastate waters."[10] State water quality standards "consist of the

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[4] *See* Pebble Project Final Environmental Impact Statement (FEIS), July 24, 2020, at 4.22–88 (attached to these comments).
[5] FEIS at 4.22–88.
[6] FEIS at 4.22–88.
[7] FEIS at 4.22–88.
[8] FEIS at 4.22–114.
[9] 33 U.S.C. § 1341(a)(1).
[10] *PUD No. 1 of Jefferson County v. Washington Dep't of Ecology*, 511 U.S. 700, 704 (1994).

designated uses of the navigable waters involved and the water quality criteria for such waters based on such uses[,]"[11] and must "include 'a statewide antidegradation policy' to ensure that '[e]xisting instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.'"[12] Compliance with water quality standards lies at the heart of the certification required under Section 401. Indeed, U.S. Environmental Protection Agency (EPA) regulations require that certifications include a "statement that there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards."[13]

For numerous reasons, DEC cannot issue a Certification that satisfies Section 401's requirements based on currently available information. Fundamentally, the Pebble Mine's application and the Corps' Final Environmental Impact Statement (FEIS) on which it relies are insufficient because they fail to identify with any specificity the water treatment technology Pebble will employ to treat discharges from the water management system, and fail to provide any evidence of any facility anywhere treating anything near the volume of water and concentration of pollutants that will be discharged from the Pebble Mine. Because the Pebble Mine's effect on Alaska's water quality can only be determined by assessing the availability and efficacy of the water treatment methods to be employed, DEC cannot conduct the analysis required to satisfy the CWA. Without knowing exactly what measures will be employed to avoid and minimize impacts to water quality, and without a demonstration of the proven effectiveness of those measures, DEC cannot "reasonably assure" that the Project "will be conducted in a manner which will not violate applicable water quality standards," including the required antidegradation review.

DEC's consideration of the Pebble Mine's application for a Section 401 certification is premature, because the project proponents have not fully specified how they will avoid violating state water quality standards. 18 AAC 15.180(b) specifies that "[c]ertification requests for any federal license or permit other than an NPDES permit will be processed in substantial conformity with secs. 130 - 170 of this chapter."[14] In turn, section 18 AAC 15.130(b) provides that:

> Within 30 days after receipt of an application for certification, the department will, if necessary, serve notice upon the applicant that additional information is necessary in order for the department to determine whether the discharge will comply with the applicable provisions of 33 U.S.C. 1311, 1312, 1313, 1316, and 1317 (Clean Water Act), secs. 301, 302, 303, 306, and 307, and that the additional information must be served upon the department within 30 days after receipt of the request. If the information is not served upon the department within the time period specified, certification will be denied unless a time extension is approved by the department upon the applicant's showing, to the department's

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[11] 33 U.S.C. § 1313(c)(2)(A).
[12] *PUD No. 1*, 511 U.S, at 705 (quoting 40 C.F.R. § 131.12).
[13] 40 C.F.R. § 121.2(a)(3).
[14] 18 AAC 15.180(b).

satisfaction, that additional time is necessary to provide the needed information.[15]

Pebble has asked the Corps to conduct its analysis and permit what would be the largest mine ever allowed under the CWA while continuously changing the project design. Inexplicably, the Corps has gone along with this, and has rushed to complete its review this summer. In its haste, the Corps has prepared a FEIS that violates both the National Environmental Policy Act (NEPA) and the CWA.

The FEIS is fundamentally flawed and cannot be relied upon by DEC to determine, with reasonable assurance, that water quality criteria will be met. The number of problems with the FEIS is staggering. The scope of analysis is completely inadequate to account for impacts to ecosystems, and for purposes of DEC's review, water quality. The baseline documents remain inadequate, with far too many data gaps to allow for a thorough review of water quality impacts. Some of the underlying assumptions are flat out wrong. Based on the inadequate analysis, and information relied on in that analysis, the Corps cannot comply with NEPA or the CWA based on these documents. Because the Corps has failed to satisfy its own obligations, any reliance on this flawed analysis by DEC would be improper.

DEC thus must issue a finding that the Pebble Mine's application materials are incomplete, demand that the company withdraw its application until it can provide the information required to reasonably determine the Pebble Mine's impact on water quality standards, and—only once it has collected all of the necessary information—initiate a new Section 401 review that comprehensively assesses the effects of the proposed project. Specifically, DEC must require the Pebble Mine proponents to provide additional information sufficient to establish that field-tested technology exists that has been proven capable of treating the volumes of water projected to be produced by the Pebble Mine and to reduce the pollutant concentrations below state water quality standards, and that Pebble will employ this technology at the mine. DEC must not rush this critical process to meet arbitrary deadlines set by Pebble Mine's proponents or the Corps.

A. The Pebble Mine Will Cause Ongoing Violations of Water Quality Standards.

1. The Pebble Mine Will Create a Source of Contaminated Water that Will Require Perpetual Treatment.

Even the FEIS for the Pebble Mine, which chronically underestimates and under-analyzes potential impacts, acknowledges quite plainly that the impoundments at the proposed mine will contain high volumes of water that exceed water quality standards for multiple parameters. The FEIS also projects that these impoundments will need to perpetually discharge extremely high volumes of water from these contaminated impoundments to maintain the necessary water balance. The only way Pebble can prevent these large volumes of contaminated discharges from

[15] 18 AAC 15.130(b).

creating violations of water quality standards in the receiving streams is to employ treatment technology capable of reducing pollutant concentrations to levels below the water quality standards.

Section 4.18 of the FEIS, "Water and Sediment Quality," states that "[p]ond water quality in TSFs and WMPs would exceed water quality standards."[16] The FEIS further acknowledges that the mine's ability to avoid water quality standard exceedances depends on its ability to capture, store, and treat all water that comes into contact with any part of the mining operations, stating that "[a]ll runoff water contacting the facilities at the mine site and water pumped from the open pit would be captured to protect overall downstream water quality. Prior to discharge to the environment, any water not meeting applicable discharge requirements would be treated."[17]

The FEIS further acknowledges that the mine will be required to capture, store, and treat this contact water in perpetuity to avoid water quality standard violations, noting "[t]he duration and likelihood of treated discharge would be long-term and certain, if the mine is permitted and built."[18] Once ground disturbance begins, the mine will start producing this contact water requiring treatment. As precipitation and groundwater flow will continue to bring water into contact with exposed materials at the mine in perpetuity, the only way the mine will be able to prevent exceedances of water quality standards is to successfully treat those discharges.

The FEIS projects exceedances of multiple parameters in water from the mine pit:

> Water quality in the pit lake would be expected to be initially acidic, becoming slightly alkaline over time, with elevated concentrations of TDS, hardness, sulfate, and some metals (aluminum, antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, and zinc) exceeding water quality standards as a result of the oxidation of sulfide minerals in the pit walls, and the natural concentrations of metals found in the unmined mineralized rock.[19]

The concentration of some of these parameters in the impoundments will exceed water quality standards many times over, during all stages of operation and closure. For example, according to the "predicted water quality" tables provided in the FEIS Appendix, the concentrations of selenium and mercury in the "main embankment seepage collection pond" will be approximately 11x and 40x the water quality standards, respectively, throughout operation and closure phases.[20]

The FEIS and its supporting materials also project extremely high volumes of water to be discharged from the on-site impoundments containing the contaminated water. Appendix K4.18

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[16] FEIS 4.18, Table 4.18-1.
[17] FEIS 4.18–10.
[18] FEIS 4.18–10.
[19] FEIS 4.18–21.
[20] *See* Appendix K4.18, tables K4.18–4 through K.18–8.

states that "The combined annual average WTP discharges from the WTPs for the 10th, 50th, and 90th percentile climate scenarios (i.e., dry, average, wet) are anticipated to be 19, 30, and 41 cubic feet per second (cfs), respectively (Knight Piésold 2019s). Discharge volumes may vary month-to-month based on the timing and magnitude of precipitation and snowmelt; however, in general on an annual basis, the dry scenario had the lowest total discharge and the wet scenario yielded the greatest total discharge."[21] Those projected volumes of water are equivalent to a range of 12,277,618 to 26,493,808 gallons per day. This is an amount similar to the amount of wastewater treated by the Municipality of Anchorage, though with far higher levels of toxic pollutants.[22] All of that water will have to be treated to achieve compliance with water quality standards. Dr. Kendra Zamzow has noted, in her comments on the FEIS, that "[t]here is no mine in the world that is currently attempting to treat volumes of water as high as Pebble will expect."[23]

The Pebble Mine's ability to maintain compliance with water quality standards is entirely dependent on the success of the water treatment systems.[24] Even then, the FEIS acknowledges that the mine is likely to cause exceedances of water quality standards, "over the life of the mine, it is possible that APDES permit conditions may be exceeded for various reasons (e.g., treatment process upset, record-keeping errors) as has happened at other Alaska mines."[25]

2. Pebble Has Failed to Identify Water Treatment Technology Proven Capable of Treating the Volume of Water or Concentration of Pollutants that Will Be Produced by the Mine.

Despite the fact that the Pebble Mine can only avoid violating water quality standards for multiple parameters if its water treatment system is effective in perpetuity, Pebble has failed to provide final plans for the water treatment system. The omission of this critical information is particularly problematic because Pebble has also failed to identify any mine anywhere in the world that is successfully treating the volume of water and concentration of discharge water projected to be produced at the Pebble Mine.

EPA identified these deficiencies in its comments on the Draft Environmental Impact Statement (DEIS), noting that "[t]he DEIS may substantially underpredict potentially significant impacts to water quality" because "The DEIS lacks critical details regarding the design and operation of the water treatment plants," and that this lack of critical detail "prevents meaningful

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[21] FEIS K4.18–2.
[22] *See* Anchorage Water & Wastewater Utility, "2019 Anchorage Water Quality Report" (available at https://www.arcgis.com/apps/Cascade/index.html?appid=e926951637be415780b9171fc285b4a).
[23] Zamzow, Kendra, August 15, 2020, *Re: Pebble FEIS on discharge of selenium* (Zamzow, 2020) at 4 (attached to these comments).
[24] FEIS 4.18–13 ("Assuming these protections are adopted, direct and indirect impacts of treated contact waters to off-site surface water are not expected to occur.").
[25] FEIS 4.18–13.

analysis and disclosure of potential water quality impacts related to water treatment."[26] The missing information identified by EPA has not been provided in the FEIS.

i. Major Parts of the Proposed Water Treatment System Remain Undefined.

Although the FEIS provides a conceptual framework for certain portions of the water treatment system, critical aspects of the design remain undefined. As stated in FEIS Appendix K4.18, "The documents do not include specifics as to the operating conditions, and do not show intra-plant treatment approaches, but rather focus on the overall mass balance for each treatment plant, and provide references for the basis of their analysis."[27] The treatment system that provides the basis for Pebble's application for a 401 certification is therefore merely conceptual and theoretical. The FEIS acknowledges this absence of critical detail in several locations.

The FEIS states bluntly that the information on the water treatment system provided by Pebble

> is at a conceptual stage of development, and there is limited ability to identify potential significant technical failures of the treatment strategies. There are concerns that the approach has not been commercially demonstrated at the proposed scale; that removal efficiencies assumed for selenium are optimistic; and that salts could build up over time in the pyritic TSF, leading to increased total dissolved solids (TDS) concentrations requiring treatment.[28]

The lack of concrete detail prevents a full and complete evaluation of the ability of the treatment system to prevent exceedances of water quality standards in the jurisdictional receiving streams. The FEIS acknowledges as much noting "[g]iven that the information provided is at a conceptual stage of development, there is limited ability to identify significant technical failures of the treatment strategies."[29]

The FEIS further states that the efficacy of the proposed treatment system cannot be determined until additional information is provided, including "additional studies needed to identify the types and concentrations of salts species might reach their solubility limits in the pyritic TSF."[30] Other currently missing information that is necessary to accurately determine the potential for the water treatment system to bring the discharges within water quality standards includes "detailed process water and mass balance modeling, pilot plant testing, backup

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[26] Pebble Mine Draft EIS Comment Letter from Chris Hladick, Regional Administrator, U.S. Environmental Protection Agency, to Shane McCoy, Program Manager, U.S. Army Corps of Engineers, July 1, 2019, at 3 (attached to these comments).
[27] K4.18–49.
[28] FEIS 4.18–13.
[29] FEIS K4.18–49.
[30] FEIS 4.18–13.

treatment trains, influent flow monitoring, and the addition of RO membranes if necessary."[31] The FEIS additionally concludes that "concerns regarding potential long-term increased TDS levels may require further investigation as design progresses."[32]

The FEIS and its supporting materials also make clear that the missing information is not merely a technicality that can be filled in later, but goes to critical questions of whether the treatment system can function at all. Appendix K4.18 includes a list of missing information that is critical to determining the "technical viability" of the proposed treatment strategy and whether the Pebble Mine will be able to bring its discharges within water quality standards:

- The treatment process anticipates using a combination of precipitative techniques (pH control via lime addition, iron co-precipitation, sulfide reduction) to convert dissolved species to a state that would allow removal by sedimentation and filtration processes. Although the solution is fundamentally sound, the mechanism for removal of various constituents requires different operational conditions in terms of pH and ORP to produce the solids. The information provided in HDR (2019g, h) and PLP 2019-RFI 021h does not specifically define the operating conditions in the WTPs, which creates uncertainty as to the effectiveness of the overall solutions. Further information would be required during the permitting process to fully assess the treatment solution.

- Subsequent to conversion to a solid phase in WTP #2, the solution assumes that salt mass would be sequestered in the pyritic TSF, and would be effectively removed from the water circuit permanently. This condition relies on the assumption that the solids remain thermodynamically stable in the pyritic TSF; and further, that the conditions in the impoundments themselves do not change appreciably over time or be subject to significant changes in the mining operations. There are numerous possible permutations of salts that could occur; further mass balance analysis using equilibrium equations would indicate if and where the concentrations of salts species might reach their solubility limits in the pyritic TSF. Therefore, further evaluation of conditions in the pyritic TSF and the potential for remobilization of salt mass would be required during the permitting process to identify the validity of this assumption.

- The removal efficiencies for various constituents are quite high relative to performance observed in other operating mine treatment systems in the world. Although PLP has provided literature references as the basis for their assumption, the information appears to be optimistic. This is particularly true for selenium, which is to be removed to less than 2 parts per billion (ppb) using a sulfide-based chemical-reducing agent combined with iron-coprecipitation. The literature references provided for this technique in PLP 2019-RFI 021h are dated, and do not align with more recent references such as the North American Metals

[31] FEIS 4.18–13.
[32] FEIS 4.18–22.

> Council white paper on selenium removal technologies (CH2MHill 2010, 2013). Further evaluation would be required during the permitting process to fully assess the validity and reasonableness of the treatment solution of the removal efficiencies under the specific operational conditions to confirm potential effectiveness, and would also need to consider the impacts of operational conditions on the removal of other various constituents of concern.[33]

The Corps' contractor for preparation of the FEIS, AECOM, has expressly acknowledged the extent to which the proposed water treatment technology is untested and unproven and diverges from standard industry practice. In a November 2019 meeting with representatives from state and federal agencies, AECOM stated that the proposed approach for treating selenium "is very novel approach has not been demonstrated in industry, does not use industry standard of the biological approach."[34] AECOM itself "[v]oiced some concern" that the required water treatment "could be accomplished on scale proposed."[35]

These frank admissions from Pebble's contractor remove any doubt that the proposed water treatment system is anything other than conceptual and speculative. This fact forecloses the ability of DEC to assume that the treatment system will function as intended, or its ability to make the required "reasonable assurance" determination on the supposition that Pebble can achieve compliance with water quality standards.

ii. DEC Cannot Issue a 401 Certification on the Assumption that the Missing Information Will Be Provided at a Late Stage of Permitting, Because No Technology Currently Exists That Is Capable of Treating Pebble's Discharges.

As is indicated by the multiple references to "further evaluation . . . during the permitting process" in the FEIS excerpts quoted above, Pebble and the Corps appear to believe that it is acceptable and appropriate to proceed with permitting while critical aspects of the water treatment system remain conceptual and unproven. This is flatly inconsistent with the requirements of the CWA. To issue the 401 Certification for the mine, DEC must determine "that there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards."[36] The Alaska Supreme Court has further clarified that DEC's "reasonable assurance" finding must be supported by "substantial evidence."[37] Here, there is no evidence that Pebble will ever be able to install a treatment system capable of reducing pollution concentrations in the mine's discharges to levels below water quality

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[33] FEIS K4.18–49 to 50 (emphasis added).
[34] U.S. Army Corps of Engineers, Pebble Project EIS Technical Meeting Notes, Nov. 20, 2019, at 7 (attached to these comments).
[35] *Id.*
[36] 40 C.F.R. § 121.2(a)(3).
[37] *Miners Advocacy Council, Inc. v. State, Dep't of Envtl. Conservation*, 778 P.2d 1126, 1139 (Alaska 1989).

standards, because there is no treatment system in existence anywhere in the world capable of such a feat.

Dr. Kendra Zamzow disagrees with the FEIS that Pebble may wait to provide additional detail on the proposed treatment system until a later stage of permitting. It is Dr. Zamzow's opinion that "[i]nstead of vague language, a pilot plant should have been ***required*** before the FEIS was allowed to be completed. This would have provided better information on salt buildup and plant efficiency, and details of disposal locations for waste products, such as salt, would have been included in a FEIS."[38]

The absence of detail in Pebble's description of the required water treatment system is particularly problematic because there are no similar treatment systems in existence and at any other mines. As the FEIS Appendix acknowledges, "[i]t should be disclosed that the approaches have not been demonstrated elsewhere at the scale of the Pebble Mine, and the specific configurations of treatment processes have not been commercially demonstrated."[39] It would be one thing if Pebble's proposed treatment system were partially conceptual with the mine's proponents identifying other similar operations that have proven capable of achieving compliance with water quality standards. But that is not the case. There is simply no evidence that Pebble—or any mine—could ever achieve the pollutant reductions that will be required to avoid violations of water quality standards.

In fact, some of the fundamental assumptions informing the projections for the treatment success of the water treatment system are directly contradicted by actual on-the-ground experience at existing mines. For example, Appendix K4.18 notes that:

> The removal efficiencies for various constituents are quite high relative to performance observed in other operating mine treatment systems in the world. Although PLP has provided literature references as the basis for their assumption, the information appears to be optimistic. This is particularly true for selenium, which is to be removed to less than 2 parts per billion (ppb) using a sulfide-based chemical-reducing agent combined with iron-coprecipitation. The literature references provided for this technique in PLP 2019-RFI 021h are dated, and do not align with more recent references such as the North American Metals Council white paper on selenium removal technologies (CH2MHill 2010, 2013).[40]

In other words, the only available evidence from systems actually in operation contradicts Pebble's conceptual design and projections.

The absence of any validated data from existing treatment systems calls into serious question the reliability of Pebble's treatment projections. Dr. André Sobolewski, a water

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[38] Zamzow, 2020 at 4 (emphasis in original).
[39] FEIS K4.18–49.
[40] FEIS K4.18–50.

treatment specialist with 30 years of experience with large scale mining operations, has evaluated the FEIS and its supporting documents, and concluded that the proposed water treatment system is unproved, fails to follow industry standards, and is likely to lead to violations of water quality standards:

> The proposed water treatment plants (WTPs) are large, complex and, contrary to the [Corps'] assertion, do not use industry standards and proven processes and technologies. On the contrary, the chemical process proposed for selenium removal is unproven, will be ineffective and result in exceedances of ADEC standards during mine operation. The treatment performance predicted for other contaminant is overly optimistic: there is a high risk that WTPs will not meet stringent discharge criteria. Worse, these claimed performance are not supported by testwork, published literature or case studies. It is unacceptable that a treatment system proposed in an EIS – one that uses unproven technology – should be accepted on faith.[41]

Dr. Sobolewski finds that the projected reduction in selenium concentrations is unsubstantiated, and inconsistent with what's been achieved at existing operations:

> The removal rates . . . are not substantiated in the FEIS by any testwork, literature or case studies. They appear to originate from modelling simulations rather than real-world experience. Given the well-known fact that metal removal becomes exceedingly difficult at trace levels, these removal rates are not credible. These predictions are even less credible when accounting for the salt buildup predicted within the water management circuit, as it is well-known that removal efficiencies are strongly affected by the salt composition of wastewater (e.g., Peng and Escobar, 2003). There is no indication that the removal efficiencies presented in Table 2 account for anticipated increases in salt concentrations. Therefore, they cannot be considered reliable.[42]

Dr. Sobolewski predicts that Pebble's discharges will exceed water quality standards for selenium within six years:

> Not only will selenium concentrations increase, they will reach concentration that overload the capacity of WTP #2 to meet the state discharge criteria for selenium. As currently designed, the Alaska state limit of 0.005 mg/L for selenium will be exceeded in effluent of WTP #2 within 6 years of operation.[43]

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[41] Sobolewski, Andre, August 23, 2020, *Review of water treatment plants proposed in FEIS for Pebble Project* (Sobolewski, 2020) at 1 (attached to these comments).
[42] Sobolewski, 2020 at 9.
[43] Sobolewski, 2020 at 18.

Ultimately, Dr. Sobolewski concludes that "Pebble is proposing a water treatment system with an unrealistic treatment performance and unattainable effluent concentrations for regulated contaminants."[44]

That the proposed water treatment system for the Pebble Mine is untested and unproven distinguishes this project from other projects where courts have allowed regulators to issue a Section 401 Certification in reliance on a future Section 402 NPDES permit. For example, in *Port of Seattle v. Pollution Control Hearings Board*, the Washington Supreme Court upheld a Section 401 Certification for an airport expansion over objections that the regulator improperly relied on the fact that the project would be required to comply with the terms of a Section 402 NPDES permit issued in the future.[45] But in that case, the project in question was an expansion of an existing facility, and the discharges at issue would result from stormwater runoff. In that scenario, the regulator had ample evidence of the performance of similar facilities, and therefore could reasonably estimate the future performance of the project. That decision is entirely distinguishable from the situation at hand, where Pebble is proposing a completely untested treatment system for a mine of unprecedented size in a uniquely harsh environment. Because DEC has no examples it can review and analyze to estimate whether and how the Pebble Mine will be able to achieve compliance with water quality standards, it cannot make the required "reasonable assurance" determination on the basis of a future NPDES permit.

III. EVEN IF PEBBLE MANAGES TO REDUCE POLLUTANT CONCENTRATIONS IN ITS DISCHARGES TO BELOW WATER QUALITY STANDARDS, THE MINE WILL STILL CAUSE VIOLATIONS OF WATER QUALITY STANDARDS DOWNSTREAM.

Direct discharges from the mine's water treatment system are only one source of Pebble's contribution of pollutants to downstream ecosystems. In addition to considering whether Pebble has adequately established that it has designed a treatment system capable of reducing pollutant concentrations below water quality standards, DEC must also consider the combined effect of all other sources of pollution. Most notably, DEC must consider whether fugitive dust deposition, when combined with pollutant concentrations in the mine's discharges, will cause exceedances of water quality standards.

A. Fugitive Dust Will Adversely Impact Water Quality.

The proposed Pebble Mine would generate over 11,000 tons of fugitive dust per year.[46] The FEIS does not fully account for the impacts to water quality from this significant amount of fugitive dust. The FEIS does not adequately assess impacts of fugitive dust on water quality from either runoff or direct deposition on water bodies. The FEIS also artificially restricts consideration of the constituents of fugitive dust to a subset of the actual pollutants that will be

[44] Sobolewski, 2020 at 16.
[45] *Port of Seattle v. Pollution Control Hearings Board*, 151 Wash.2d 568, 603 (2004).
[46] *See* U.S. Army Corps of Engineers, Pebble Project EIS Request for Information (RFI) 007, July 31, 2018 at 3.

present in the dust and that may impact water quality. The calculations of contaminant loading in waterbodies caused by fugitive dust are flawed because they assess fugitive dust water quality impacts in isolation, rather than together with projected contaminant loading from other established sources, such as discharges from the mine's water treatment plants.

The proposed Pebble Mine will generate fugitive dust from multiple sources. The mine will produce dust via mine activities, including blasting, drilling, wind erosion from stockpiles and overburden, and dust plumes produced by vehicles moving over unpaved surfaces.[47] The FEIS section on water quality impacts offers only a scant two paragraphs on the impacts of fugitive dust.[48] The analysis provides conclusory findings without meaningfully quantifying the impacts and consequences, or explaining data relied on or the basis for analysis.[49] The FEIS states:

> Fugitive dust from various mine site sources with elevated levels of certain metals would be deposited on soils surrounding the mine site. Impacts on surface water quality would be through erosion or leaching of these metals into runoff leading to downgradient waterbodies, or through deposition directly on waterbodies. . . . In terms of impact magnitude, the calculations indicate that the dust deposition would not result in exceedances of the most stringent water quality criteria (see Table K3.18–1) when added to baseline conditions or WTP outflow conditions (AECOM 2019h).[50]

The tables cited in the dust impact analysis (K3.18–1, K4.18–18 and K4.18–18) merely list the water quality criteria, and offer no analysis.

Fugitive dust will impact water quality in the area surrounding the mine site in two primary ways: chemical toxicological effects, and physical effects, such as turbidity.[51] While the FEIS purports to assess "dust deposition on water quality,"[52] the FEIS chapter on water quality fails to include any substantive analysis of these impacts. The FEIS also fails to properly assess all of the vectors by which contaminants in fugitive dust will reach surface waters and impact water quality. For example, an appendix to the FEIS notes that the modeling for water quality impacts from fugitive dust does not account for overland runoff.[53] The FEIS does not adequately explain the rationale behind this conclusion, and no studies or direct measurements are cited as informing the decision to exclude this source. Similarly, the FEIS fails to assess contaminant loading from fugitive dust that leaches into groundwater that is hydrologically connected to

[47] Zamzow, Kendra, et al., May 30, 2019, Fugitive Dust Issues in the Pebble Project Draft EIS, U.S. Army Corps of Engineers (Zamzow, 2019b) at 4 (attached to these comments).
[48] FEIS at 4.18–20.
[49] FEIS at 4.18–20.
[50] FEIS at 4.18–20.
[51] *See* Zamzow, 2019b.
[52] FEIS at 4.18–1.
[53] FEIS at Appendix K4.18–60.

surface water. Nor does the FEIS account for contaminant loading from snowmelt from areas where snow has accumulated layers of dust throughout the winter.

The FEIS's assessment of the chemical and toxicological impacts of water quality contamination by fugitive dust is particularly inadequate because the FEIS treats water quality impacts from fugitive dust in isolation, rather than in connection with other sources such as discharges from the water treatment plants. As a result, the FEIS fails to assess the ecological impacts of the combined pollutant loadings. In particular, the FEIS fails to consider whether concentrations of selenium in the streams below the mine would exceed even Alaska' current water quality standard once all sources are considered together. In addition to the potential to contribute to exceedances of specific pollutants, such as selenium, the introduction of trace elements from fugitive dust may also increase the potential for negative synergistic impacts among pollutants. For example, copper can act synergistically with zinc, magnifying some impacts. The FEIS completely fails to assess these additive impacts.

The FEIS also entirely fails to assess the water quality effects of fugitive dust on turbidity. Beyond the water quality impacts from trace metals and other chemical pollutants, fugitive dust from the Pebble Mine will increase the turbidity of surface waters, including in particular the many small ponds near the mine site.[54] The FEIS acknowledges that precipitation and runoff events may lead to "an influx of fine sediment and increased turbidity into gravel-dominated streambeds."[55] Gravel beds provide critical spawning habitat. The FEIS's analysis of sedimentation impacts, including degradation of gravel beds, is woefully inadequate. The FEIS's conclusions that turbidity "can adversely affect fish"[56] provides no indication of actual anticipated impacts. The FEIS dispels concerns by relying on Pebble's yet-to-be-defined best management practices to mitigate sedimentation and turbidity impacts.[57] Fugitive dust deposition on ponds may cause temporary turbidity, and may block photosynthesis.[58] Reduction in water clarity could substantially affect aquatic ecosystems, including by degrading waters and killing vegetation.[59] Particulates from fugitive dust may also alter the physical substrate conditions in water bodies.[60] Particulates from dust may abrade benthic plants and animals, and may clog the interstices of coarse gravel beds degrading the intragravel environment and potentially harming eggs and larvae of salmonids and other substrate-spawning fishes.[61] The FEIS fails to assess these associated water quality impacts from fugitive dust.

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[54] *See* Zamzow, 2019b at 22.
[55] FEIS at 4.18–28; *see also* FEIS at 4.18–30 (acknowledging turbidity in downstream water bodies from the road corridor and again relying on best management practices to mitigate impacts without assessing what those impacts may be).
[56] FEIS at 4.24–4, Table 4.24–1.
[57] FEIS at 4.18–28.
[58] Zamzow, 2019b at 23.
[59] Zamzow, 2019b at 25.
[60] Zamzow, 2019b at 25
[61] Zamzow, 2019b at 25–26.

B. Pebble's Proposed "Mitigation" For the Failure of Its Proposed Water Treatment System Will Itself Cause Violations of Water Quality Standards By Cutting Off Streamflow.

Pebble attempts to make up for its inability to fully describe a water treatment system built around proven water treatment technology with established results by claiming that it will have the ability to design and install a replacement system as needed. This approach is fatally flawed because it assumes incorrectly that the water management system has the capacity to retain three years of discharges, assumes incorrectly that a replacement treatment system would be available that could accommodate the volumes of water and concentrations of pollutants projected, and assumes incorrectly that such a replacement system could actually be installed within three years. The approach is also flawed because it would require completely stopping all discharges from the water treatment system for up to three years, but the FEIS entirely fails to consider the environmental impacts that would follow from this abrupt cessation of flow to the receiving streams.

When addressing potential concerns with the effectiveness of the proposed water treatment system, the FEIS merely states that Pebble will have the ability to update the treatment system as needed. The FEIS states "The operational capacity of the main WMP provides flexibility (equivalent to 3 average years of water discharge time) to allow time for addressing process interruptions (PLP 2019-RFI 021h)."[62]

The Appendix to the FEIS repeats this assertion, but also observes that Pebble has not included any evidence that it would actually be possible to design, install, and operate a replacement system within the three-year window. Appendix K4.18 states

> If the treatment strategy proves to be ineffective, modification to the treatment system would be required, which may include the modification of the treatment plants with additional unit processes, such as further RO trains and/or salt removal techniques such as thermal evaporation. Further, the contention is that the water ponds would allow for sufficient storage for up to 3 years of impoundment to allow for implementation of these changes. The mitigations are reasonable technical strategies, but the ability to implement such significant changes to the treatment processes within a 3-year period requires further evaluation to determine if engineering and construction can be completed.[63]

Once again, Pebble has failed to provide the minimum information required to assess the efficacy of its proposed treatment system.

As an initial matter, the fundamental premise that the main WMP can provide storage for up to three years of discharges is not supported by the facts. Dr. Cameron Wobus—a senior scientist with approximately 15 years of experience in geomorphology, hydrology, and

[62] FEIS 4.18–13.
[63] FEIS K4.18–50.

environmental data analysis and modeling—reviewed the portions of the FEIS and supporting materials relating to the capacity of the WMP and volumes of water that would need to be retained. Dr. Wobus determined that "under normal operations" the WMP could only provide "approximately one year" of storage.[64] Even under "the optimistic scenario in which a WTP failure occurred when the WMP was at its minimum storage volume," there would only be "approximately 2 years of storage."[65] Dr. Wobus concludes that "[i]n no case would there be enough storage in the WMP to hold three years of wastewater under normal operating conditions."[66]

In fact, it is extremely unlikely that Pebble could design, install, and begin operating a replacement water treatment system even if it had the full three years. Water treatment expert Dr. Sobolewski highlights that other mines with simpler treatment requirements took almost five times as long to design and install similar systems:

> A review of the eMalahleni treatment system states that it took 15 years to develop from concept to startup of the full-scale plant. This timeline is unrealistic for the Pebble Project. Significantly, the development process was supported by Anglo American, a company with far greater financial resources than Northern Dynasty. Additionally, the plant operates in South Africa, where sulfate removal from warm water is easier than in the cold water at Pebble. It is likely that developing the proposed sulfate removal process at Pebble will be challenging and will tax the resources of Northern Dynasty Minerals. It is unacceptable to propose in a FEIS such a complex, technically-challenging treatment system without showing how PLP will bring it into full operation when it is needed.[67]

Furthermore, Pebble has failed to evaluate the impacts to water quality that would follow from eliminating discharges from the water treatment system for up to three years while it attempts to fix its treatment system. Instead, the FEIS actually highlights the importance to downstream ecosystems of maintaining regular discharges of treated water from the treatment system. The FEIS highlights the importance of discharged water from the water treatment system to maintaining downstream water volumes and habitat during projected normal operations. "Water from both treatment plants would be strategically discharged in a manner that would optimize downstream aquatic habitat, based on modeling and monitoring during discharge (PLP 2020d)."[68] Entirely eliminating all discharges from the water treatment system for up to three years is the opposite of a strategic or optimized approach.

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[64] Wobus, Cameron, PhD., Lynker Technoilogies, Robert Prucha, PhD., Integrated Hydro Systems, August 19, 2020, *Comments on Pebble Project Final EIS*, at 26 (Wobus, 2020) (attached to these comments).
[65] Wobus 2020 at 26.
[66] Wobus, 2020 at 26.
[67] Sobolewski, 2020 at 16.
[68] FEIS at 4.18–13.

Dewatering the receiving streams will have significant adverse impacts on downstream aquatic communities. Dr. Wobus determined that "the 30 cfs average annual discharge from the wastewater treatment plant represents anywhere from ~60% (at 13 miles downstream) to ~100% (at 3.5 miles) of baseline annual average flows in the upper South Fork Koktuli."[69] Reviewing Table K4.16-21 in the FEIS, which summarizes the changes in streamflow in the SFK downstream of the mine in the case where no treated water is being discharged back into the stream, Dr. Wobus notes that "monthly streamflow reductions would range from 0% in March to as much as 80% in January, with an annual average of 12.4%" at one downstream locations, and "monthly streamflow reductions would range from a low of 13.5% in May to a high of 42% in April, with an annual average of 24.3%" at another location.[70] Dr. Wobus concludes that "Based on information contained in the FEIS, a shutdown of the WTP would therefore be expected to create moderate to major changes in ecosystem function at least 3.5 miles downstream of the mine site, and measurable changes in structure at least 13 miles downstream of the mine site."[71] As a result, the receiving streams may no longer be able to support their designated uses. These foreseeable ecological impacts are not described at all in the FEIS.

C. Even if the Pebble Mine Does Not Retain its Discharges to Upgrade the Water Treatment System, Normal Operations of the Mine Will Reduce Streamflow and Raise Water Temperature in Ways that Will Have Substantial Impacts to Water Quality.

Due to the size and scale of the proposed mine, and the likely future expansion, "one of the most significant impacts of mining on the ecology of the Bristol Bay watershed will be due to changes in streamflow and water quality."[72] In its Proposed Determination, EPA found that "mining of the Pebble deposit at any of [the three mining scenarios identified] even the smallest, could result in significant and unacceptable adverse effects on ecologically important streams, wetlands, lakes, and ponds and the fishery areas they support."[73] As a result, EPA proposed restricting the discharge of dredged or fill material if, among other things, streamflow alterations would be greater than 20% of daily flow in 9 or more linear miles of streams with documented anadromous fish occurrence.[74]

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[69] Wobus, 2020 at 26-27.
[70] Wobus, 2020 at 27.
[71] Wobus, 2020 at 27.
[72] Welker, Molly, June 18, 2018, Scoping Comments for the Pebble Project USACE Permit Application no. POA 2017-271 (Welker Scoping Comments, 2018) at 8 (attached to these comments).
[73] The Proposed Determination of the U.S. Environmental Protection Agency Region 10 Pursuant to Section 404(c) of the Clean Water Act: Pebble Deposit Area, Southwest Alaska (Proposed Determination), July 17, 2014, at ES–5 (attached to these comments).
[74] Proposed Determination at ES–6.

The proposed mine will result in substantial flow reduction for miles upon miles of fish-bearing streams, tributaries to fish-bearing streams, and wetlands. The FEIS anticipates that the South Fork Koktuli-E segment will see an annual mean monthly reduction of 42.8%.[75] Post-closure, the flow will continue to be reduced from pre-mining conditions by 32.8%.[76] DEC cannot grant certification based on the FEIS's analysis of flow reduction and resulting impacts to water quality because the FEIS is severely flawed and does not include requisite analysis to determine whether reduction of flow will in fact not affect water quality criterion to the point of leading to water quality exceedances.

1. The water modeling is flawed and mis-represents project impacts to streamflow.

In an analysis of the DEIS water balance assessment, Dr. Wobus found that "the monthly change factors reported in the DEIS appear to substantially underestimate streamflow reduction impacts."[77] In an integrated hydrologic modeling analysis of the proposed Pebble Mine, Dr. Prucha used MikeSHE, an internally consistent code that models rainfall, runoff, infiltration, evaporation and other processes.[78] The monthly flow changes modeled by Dr. Prucha in MikeSHE provide a stark contrast to those modeled in the DEIS.[79] "[I]n many cases, the projected *daily* change factors from the MikeSHE model greatly exceed the USEPA threshold of 20%, even when the monthly average is less than 20%."[80] The 2019 Wobus Memo notes that the DEIS fails to include a description of how water treatment operations will be modified to prevent changes in daily flow.[81] Dr. Wobus concludes that "even with an active water management plan there are likely to be limitations to how well Pebble can time their water treatment releases to prevent daily or monthly streamflow fluctuations from exceeding the 20% threshold."[82] The DEIS fails to adequately assess streamflow changes and evaluate how PLP will meet EPA's threshold. Dr. Wobus notes that the failure to use appropriate models, like MikeSHE, render the analysis flawed with a water balance that simply does not balance out.[83] Absent use of the appropriate and requisite modeling that is internally consistent, the DEIS is incapable of (1) predicting the likely streamflow alterations and (2) assessing PLP's water management strategy

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[75] FEIS at 4.16–2, Table 4.16–1; *see also* 4.16–17, Table 4.16-3.
[76] FEIS at 4.16–3, Table 4.16–1; *see also* FEIS at 4.16–27, Table 4.16–4.
[77] Wobus, Cameron, May 30, 2019, *Comments on Pebble Project Draft EIS*, Prepared for Trustees for Alaska (Wobus, 2019) at 8 (attached to these comments).
[78] Wobus, 2019 at 8; *see also* Prucha, Robert H., June 6, 2019, Review of Groundwater Impacts in the Proposed Pebble Mine Draft EIS (February 2019) and Evaluation of Potential Impacts on the Coupled Hydrologic System, Prepared for The Wild Salmon Center (Prucha, 2019) (attached to these comments).
[79] *See* Wobus, 2019 at 9, Fig. 3.
[80] Wobus, 2019 at 9.
[81] Wobus, 2019 at 9.
[82] Wobus, 2019 at 9.
[83] Wobus, 2019 at 9.

to actually offset such streamflow alternations. Dr. Wobus concludes that "[s]uch an analysis is missing and renders the overall assessment of downstream impacts flawed."[84]

The Corps failed to rectify these problems in the Final EIS. In a subsequent analysis of the FEIS, Dr. Wobus confirmed that the FEIS failed to adequately address his comments. He concludes that the "new groundwater model substantially mis-represents the full range of equally-likely hydrologic impacts of the proposed project."[85]

In another report evaluating the FEIS, Dr. Reeves and Dr. Lubetkin found that the analysis of flow alterations had "a high degree of uncertainty" and that the responses to Requests for Information "do not address the concerns about uncertainty associated with the analysis presented in the FEIS."[86]

A subsequent report by Dr. Lubetkin and Dr. Reeves identified further concerns and problems regarding modeling for streamflow and groundwater.[87] That report found that the Corps and Pebble "used a complicated and interconnected set of models to address this, each with serious methodological weakness or flaws in execution."[88] One major problem with the groundwater-streamwater modeling is how it was based on monthly precipitation and as a result "had substantial errors when predicting monthly flows in both calibration . . . and validation . . . data sets."[89] The problems in analysis springboard from this error because "[t]he streamwater model is the basis of all other water models used to describe the fish habitats. If the results from this model are in error, the results from all the further analyses based [on] them will also be erroneous."[90]

Because the FEIS fails to accurately assess the water balance and water interactions between surface and ground water, DEC cannot rely on the FEIS for any conclusion that flow will not result in water quality exceedances.

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[84] Wobus, 2019 at 9.
[85] Wobus, 2020 at 2.
[86] Reeves, G.H., PhD., and Susan Lubetkin, PhD., *Uncertainties of the Analyses of Altered Flows as discussed in FEIS*, August 20, 2020 (attached to these comments).
[87] *See* Lubetkin, S.C., PhD., and Gordon H. Reeves, PhD., *A review of Pebble Project Final EIS Section 4.24, Fish Values: PHABSIM/HABSYN model estimates of salmonid usable habitat areas in the presence of Pebble Mine are baseless*, August 19, 2020 (Lubetkin & Reeves, 2020) (attached to these comments).
[88] Lubetkin & Reeves, 2020 at 3.
[89] Lubetkin & Reeves, 2020 at 3.
[90] Lubetkin & Reeves, 2020 at 4.

2. Reduced streamflow will adversely impact salmon.

EPA's Bristol Bay Watershed Assessment identified that adverse impacts from streamflow alteration "could jeopardize the long-term sustainability of these fisheries."[91] EPA found that drawdown would alter streamflows by more than 20% in approximately 9 miles of stream and that such a chance could pose unacceptable adverse impacts to the salmon fisheries of both the South Fork Koktuli and North Fork Koktuli.[92]

One of the impacts of reduced streamflow is a resulting increase in stream temperatures. Fish migration is highly sensitive to water temperature, as is spawning and incubation, and rearing.[93] Site-specific thermal patterns are also known to drive population diversification and genetic diversity.[94] As a result, populations are highly adapted to the patterns with which they evolved.[95]

In a report on the Final EIS, Dr. Gordon Reeves found that

> the conclusion of the EIS that the "The overall degree of impact is low: Expected summer and winter water temperatures post release of treated surplus water would have a negligible or even positive effect on EFH quality (rearing Chinook, coho and sockeye salmon, and spawning Chinook, chum, coho and sockeye salmon), but infrequent dry and warm years could result in temporary or short-term effect; mortalities are unlikely." (p. 80) is false and not supported by the analysis and logic provided. It uses an inappropriate standard ("optimum temperatures" for a species), ignoring the influence of local adaptation, which EPA (2014) noted was critical to consider. It also fails to recognize: (1) that small changes in water temperature can have significant ecological effects (e.g., time and size at emergence); (2) that there will be cascading effects of changes in the timing of life-history events (phenology); and (3) the cumulative effects of the interaction of effects from increased water temperatures and other environmental changes (stream flow). As a result, the assessment of potential effects of the proposed mine and the conclusions in the EIS are invalid, most likely wrong, and have a very large degree of uncertainty.[96]

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[91] Watershed Assessment at 4–27.
[92] Watershed Assessment at 4–28.
[93] See Mouw, Jason, PhD., Review of USACE Pebble Project Permit POA-2017-271 and Supporting Environmental Baseline Studies: Can Critical Assumptions be Validated to Support Assessment of Impact?, June 19, 2018 (Mouw, 2018a) at 6–7 (attached to these comments).
[94] Mouw, 2018a at 6–7.
[95] Mouw, 2018a at 6–7.
[96] Reeves, Gordon H., PhD., August 20, 2020, *Review of the Assessment of Water Temperature* (Reeves, 2020) at 1 (attached to these comments).

A full review of the available literature reveals that the salmon species present in the streams that will receive the heated water discharges from the Pebble Mine are particularly sensitive to water temperature increases, and that increases to stream temperatures during the winter are likely to significantly negatively affect these species.[97]

In comments on the Draft EIS, doctoral candidate Sarah O'Neal identifies concerns regarding the associated impacts of streamflow loss and water temperature on salmonids:

> **Percentage estimates of habitat loss in the DEIS overly simplify freshwater ecosystems spatially and temporally**. Estimates reduce habitat loss to linear distances of headwater streams and the percentages of stream distance within each basin, which vastly underestimates actual impact. The methodology overlooks the three-dimensional nature of fish habitat (or four-dimensional nature given temporal variability e.g., Stanford et al. 2005). They ignore downstream, integrated impacts of changes in streamflow, groundwater-surface water exchange, water temperatures, water quality, and food web effects (Figure 4, Vannote et al. 1980, Colvin et al. 2019).[98]

These inadequacies remain in the FEIS, such that any reliance on this analysis by DEC is without foundation.

3. Discharges of treated water will elevate surface water temperatures.

The FEIS's inadequate assessment of the impacts of increased temperatures from treated water discharges suffers from poor quality data, inconsistent data, and a failure to support or explain several critical assumptions. The proposed water treatment system will need to raise water temperature to facilitate selenium removal.[99] The FEIS acknowledges that surface water temperature may be elevated +2.9° C or approximately 5°F.[100] The result will be that "[e]ffluent discharged from the water treatment plants will be warmer than the receiving environment and may adversely impact aquatic organisms in the receiving streams."[101] A full review of the available literature would have revealed that the salmon species present in the streams that will receive the heated water discharges from the Pebble Mine are particularly sensitive to water

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[97] *See* Zamzow, 2019a at 16; Reeves, Gordon and Sue Mauger, May 24, 2019, *Review of Water Temperature Impacts in the Proposed Pebble Mine Draft Environmental Impact Statement*, Prepared for Wild Salmon Center (Reeves & Mauger, 2019) at 4 (attached to these comments).
[98] O'Neal, Sarah, July 1, 2019, Technical comments regarding fish and aquatic habitat in the Pebble Project Draft Environmental Impact Statement (O'Neal, 2019) at 8.
[99] FEIS 4.18–4.
[100] FEIS at 4.18-4, Table 4.18-1; 4.18-18.
[101] Zamzow, Kendra, et al., April 22, 2019, *Selenium Issues in the Pebble Project Draft EIS Position Paper*, U.S. Army Corps of Engineers (Zamzow, 2019a) at 13 (attached to these comments).

temperature increases, and that increases to stream temperatures during the winter are likely to significantly negatively affect these species.[102]The FEIS's assessment of the effects of heated water on salmon is particularly deficient, rendering it unsuitable for DEC to base its Section 401 analysis on.

CONCLUSION

These comments, along with the included technical reports, references, and administrative documents, demonstrate that the analysis of water quality impacts in the FEIS is flawed and inadequate, and therefore cannot provide a basis for a decision by DEC to issue a Section 401 Certification. DEC cannot make the required determination "that there is a reasonable assurance that the activity will be conducted in a manner which will not violate applicable water quality standards."[103] The FEIS cannot serve as a basis for any determinations regarding (a) whether the project will or will not contribute to water quality exceedances, and (b) reasonably anticipated water quality impacts. Based on the inadequate EIS, and equally lacking permit application, DEC should deny certification under Section 401 of the Clean Water Act.

Sincerely,

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[102] *See* Zamzow, 2019a at 16; Reeves & Mauger, 2019 at 4.
[103] 40 C.F.R. § 121.2(a)(3).

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- Wobus, Cameron, May 30, 2019, *Comments on Pebble Project Draft EIS*, Prepared for Trustees for Alaska (Wobus, 2019).

[104] Digital copies of all references are provided as attachments to these comments and submitted to DEC via USB flash drive.

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